DOCUMENT RESUME

ED 059 292 TM 001 183

TITLE	Underwriter 1-57.30--Technical Report on Standardization of the General Aptitude Test Battery.
INSTITUTION	Manpower Administration (DOL), Washington, D.C. U.S. Training and Employment Service.
REPORT NO	TR-S-14
PUB DATE	Jan 53
NOTE	13p.; Revised
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Aptitude Tests; Evaluation Criteria; *Insurance Occupations; Job Applicants; *Job Skills; Norms; Occupational Guidance; *Personnel Evaluation; Test Reliability; Test Validity
IDENTIFIERS	GATB; *General Aptitude Test Battery; Underwriter

ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

ED 059292

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

UNDERWRITER 1-57.30

B-220
or
S-14

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
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CTM 001 183

Published By
U. S. DEPARTMENT OF LABOR
Bureau of Employment Security
Washington 25, D. C.
November 1949
Revised January 1953

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STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY FOR UNDERWRITER 1-57.30 B-220 or S-14

Summary

The entire General Aptitude Test Battery was administered to an experimental sample of Underwriters 1-57.30, consisting of two groups—81 experienced workers and 27 trainees. Supervisory ratings were used as the criterion. The following aptitudes were found to be significant for this occupation: Intelligence, Numerical Aptitude, and Clerical Perception.

GATB Norms for Underwriter 1-57.30 B-220 or S-14

Table I shows the minimum acceptable score for each aptitude included in the test norms for Underwriter 1-57.30.

TABLE I
Minimum Acceptable Scores for B-220 or S-14

Aptitude	Tests	Minimum Acceptable Aptitude Score
G	CB-1-H CB-1-I CB-1-J	125
N	CB-1-D CB-1-I	120
Q	CB-1-B	105

Effectiveness of Norms

The data in Table V indicate that 18 of the 37 poor workers, or 49% of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 49% of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 34 of the 53 workers who made qualifying test scores, or 64%, were good workers.

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GAMB #520
11-49

Standardization of General Aptitude Test Battery and Development of Aptitude Test Battery for Underwriter 1-57.30

I. Problem

The study was conducted for the purpose of developing a specific aptitude test battery for Underwriter for the Farm Bureau Insurance Companies and to secure additional data for standardizing the GATB.

II. General Information

The experimental sample of Underwriters consists of two groups, an experienced group and a trainee group. Each group contained Underwriters from several different areas, Auto, Commercial, Casualty, Fire, Life, Accident and Health.

	Experienced Group	Trainee Group
Auto	38	20
Commercial	9	
Casualty	13	1
Fire	17	5
Life & Accident & Health	4	1
	81	27

The training time required to qualify for the experienced group is one year for automobile underwriting. Eighteen months was arbitrarily set as the training time for the other underwriting.

Several supervisors were tested with the group because of their interest in the project. However, their scores were not considered.

III. Experimental Battery

All parts of the GATB were given.

IV. Criterion

All examinees were considered by their supervisors as being successful (experienced) or potentially successful (trainees) underwriters.

Supervisory ratings were obtained. In an effort to make the supervisory ratings as objective as possible, elements were taken from the job analysis that seemed pertinent to job ability. Each supervisor was asked to rate all of his underwriters on each element. An overall rating was obtained also. This was done in an interview between each supervisor and a state office technician. These elements taken from the job analysis are outlined below in the form they were presented to the supervisors:

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1. Rejected Applications - Does the review of such show that one underwriter rejects more applications that could be accepted than another underwriter?

2. Correspondence - Do underwriters differ in the ability to obtain the right information through correspondence?

3. Conferring - Do some underwriters have to confer with their supervisors and other underwriters more than others concerning applications that are more than just routine?

4. Speed of Processing - Do underwriters differ, generally speaking, as to the speed at which they process applications?

5. Speed of Learning - What experienced underwriters learned with greater speed than others?

These elements were rated in a range from one to four. Here are the intercorrelations of these rated elements:

	Rej.	Corr.	Conf.	S. P.	S. L.	Overall
1. Rejected Applications		.66	.37	.08	.41	.49
2. Correspondence			.70	.24	.61	.74
3. Conferring				.44	.75	.81
4. Speed of Processing					.60	.43
5. Speed of Learning						.79

The two ratings that were thought to be the most objective from the standpoint of how the supervisors reacted to the various elements were correspondence and the overall ratings. The overall rating was used as the criterion. It seemed to be more meaningful, generally. The use of the other rating elements was thought helpful in getting the supervisors to consider objectively the ability of their workers. Just an overall four-range rating was obtained for the trainees.

Eight supervisors were contacted to obtain the ratings. One underwriter could be rated by only one supervisor. The range of the number of underwriters the supervisors rated was from 4 to 17.

Considering the subjective nature of supervisory ratings and the problem of combining such criterion data, it was thought that the criteria used were as good as could have been expected.

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V. Population

(A) Composition of Sample

Total Number	Experienced	Trainee
Employed in this job	Not Known	
Tested	81	27
Processed	81	27
a. Male	81	27
b. Female	0	0

(B) Selection of Job

The Life Office Management Association Clerical Battery has been used by this company as a general screening device for all workers. The critical or cut off score used for Underwriters has varied according to supervisors and general personnel policy. The general use of this battery of tests was not revealed until this project was practically completed. A study involving the LOMA Battery and GATB may be attempted later by either Ohio Employment Service or the Farm Bureau. College graduates are preferred. A flexible age range of from 22 to 35 with 30 as preferred was used for hiring purposes.

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Table II

Mean (M), Standard Deviation (σ), and Range of Age, Education, and Experience and Coefficients of Correlation (r) of Age, Education and Experience with the Criterion*

N = 81 (Experienced Group)

	M	σ	Range	r
Age	31.012	6.471	20-55	.166
Education (yrs.)	14.143	1.813	11-19	-.084
Experience (mos.)	35.543	30.221	12-216	.362

Three cases, ages 55, 46, and 46, could have been eliminated because of age. However, their test scores seemed to be in line with others. These three cases have little effect on the correlation between age and criterion:

Age	Criterion Rating
55	2
46	1
46	4

With these three cases eliminated the range of age would have been 20-41.

Perhaps six cases (nos. 216, 128, 116, 108, 90, 87) could have been eliminated because of too extensive experience. However, their test scores seemed to be in line with others. An inspection of the criterion ratings of these cases shows the influence of experience on criterion.

Experience	Criterion Rating
216	4
128	3
116	4
108	3
90	4
87	4

With these six cases eliminated the range of experience would have been 14-65

*Correlation coefficients are for Pearson product-moment correlation corrected for broad categories between the criterion and Age, Education, and Experience.

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It was difficult to get the supervisors to rate their underwriters objectively. The technicians who obtained the ratings were continually trying to eliminate "maturity" and "ability gained by experience" from the supervisors' thinking. Since experience (r = .362) has too much influence on criterion data, it was thought that correlations should be used only as guides in verifying mean and job description findings.

Table II-A

Mean (M), Standard Deviation (σ), and Range of Age, Education, and Experience and Coefficients of Correlation (r) of Age, Education and Experience with the Criterion*

N = 27 (Trainee Group)

	M	σ	Range	r
Age	26.59	3.154	21-34	-.080
Education (yrs.)	15.00	1.388	12-16	-.056
Experience (mos.)	5.44	1.707	3-11	.271

VI. Job Descriptions

Job Title and Code: Underwriter, 1-57.30

Work Performed: Examines new and renewal applications for automobile insurance, garage liability and commercial trucking insurance, various forms of casualty insurance, fire insurance, and applications for changes in insurance coverage of policies already in effect. Also examines applications for life insurance and accident and health insurance. Determines the risk involved, decides on insurability of applicant according to defined standards and company policy, authorizes investigations and conducts correspondence relative to the acceptance of new insurance applications and in servicing policies already in effect.

*Correlation coefficients are for Pearson product-moment correlation corrected for broad categories between the criterion and Age, Education, and Experience.

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VII. Statistical Results

Table III

Means (M), Standard Deviations (σ)
Standardized Means (M') and Standard Deviations (σ'), and
Coefficients of Correlation with the Criterion (r) for
tests in the General Aptitude Test Battery*

N = 81 (Experienced Group)

Part	M	σ	M'	σ'	r
A	23.741	4.469	109	16	-.146
B	94.235	17.590	123	18	.259
C	46.111	5.842	105	16	.170
D	36.679	4.320	126	17	.208
E	15.593	3.796	123	14	-.091
F	28.531	6.585	114	16	.024
G	144.926	18.692	109	18	.143
H	23.926	6.554	119	19	-.088
I	14.778	2.630	136	15	.219
J	35.000	7.137	131	15	.118
K	74.222	8.494	107	17	.204
L	31.247	6.686	113	17	-.086
M	92.778	7.252	111	17	.025
N	104.247	8.559	107	20	.081
O	28.667	4.017	104	18	-.174
P	30.123	3.301	107	18	-.216

*Standardized means and standard deviations are directly comparable to general population norms with a mean of 100 and standard deviation of 20 for each test. Correlation coefficients are for Pearson product-moment correlation corrected for broad categories between the criterion and each test.

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Table III-A

Means (M), Standard Deviations (σ)
Standardized Means (M') and Standard Deviations (σ'), and
Coefficients of Correlation with the Criterion (r) for
tests in the General Aptitude Test Battery.*

N = 27 (Trainee Group)

Part	M	σ	M'	σ'	r
A	24.70	3.914	112	14	.337
B	92.77	14.685	121	15	-.025
C	44.66	5.825	102	15	.106
D	35.59	5.015	124	14	.279
E	15.11	3.823	122	14	.374
F	27.29	6.732	111	16	.384
G	145.70	17.625	110	17	.284
H	23.22	6.735	117	20	.383
I	14.40	2.239	133	13	.542
J	33.74	5.239	128	11	-.164
K	74.96	7.063	108	15	-.111
L	30.81	6.880	112	18	.401
M	93.07	8.379	112	19	.109
N	102.85	9.328	104	22	.460
O	27.78	5.173	101	23	.475
P	29.92	3.030	106	17	.190

*Standardized means and standard deviations are directly comparable to general population norms with a mean of 100 and standard deviation of 20 for each test. Correlation Coefficients are for Pearson product-moment correlation corrected for broad categories between the criterion and each test.

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Table IV

Means (M), Standard Deviation (σ) and
Coefficients of Correlation with the Criterion* (r)
for each Aptitude in the
General Aptitude Test Battery

Experienced Workers N = 81			
Aptitude	M	σ	r
G-1	135.3	12.5	.159
G-2	133.7	12.1	.077
V	130.6	15.5	.116
N	131.8	13.3	.235
S	118.7	18.9	-.073
P	111.6	15.1	-.142
Q	123.2	17.5	.254
A	106.5	16.3	.205
T	108.6	18.2	.182
F	105.9	17.0	-.223
M	110.9	17.7	.054

Trainees N = 27			
Aptitude	M	σ	r
G-1	132.4	11.5	.434
G-2	131.1	10.8	.502
V	127.8	11.4	-.161
N	128.9	13.0	.425
S	116.4	19.1	.404
P	113.6	15.0	.396
Q	121.8	14.7	-.025
A	104.6	14.7	-.028
T	109.7	14.8	.119
F	102.6	21.7	.424
M	110.4	20.7	.248

*Correlation coefficients are for Pearson product-moment correlation corrected for broad categories between the criterion and each aptitude.

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VIII. Discussion

Indications for Test Score Data

Significant Tests as Indicated by Means (Table II and IIA)

Experienced Group
N = 81

Test	M'	σ'
B	123	18
D	126	17
E	123	14
F	114	16
H	119	19
I	136	15
J	131	15

Trainee Group
N = 27

Test	M'	σ'
B	121	15
D	124	14
E	122	14
F	111	16
H	117	20
I	133	13
J	128	11

Significant Aptitudes as Indicated by Table III

Aptitude	Mean Aptitude Score	
	Experienced	Trainee
G-1	135	132
G-2	133	131
V	131	128
N	132	129
S	119	116
P	112	114
Q	123	122

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Significant Aptitudes needed for the job by study of job analyses

The analyst indicated the following aptitudes significant as far as the job descriptions are concerned. The means of these aptitudes and the means of the tests in each of these aptitudes are outlined below:

Aptitudes Significant By Job Analysis	Aptitude Means		Test Standardized Means		
	Exper.	Tr.	Tests	Exper.	Tr.
G_1, G_2 (Intelligence)	135-133	132-130	H	119	117
			I	136	133
			J	131	128
			E	123	122
V (Verbal)	131	128	J	131	128
N (Numerical)	133	129	D	126	124
			I	136	133
Q (Clerical Perception)	123	121	B	123	121

On the basis of the experience group (N=81) three tests were selected for the battery namely B, I, and J. Test B was selected because it measures the required clerical perception as indicated by the job analysis, its mean is relatively high and its correlation appears significant. The job description indicates that intelligence, numerical and verbal abilities are significant aptitudes. This is verified by their means. Test I was selected because it measures the required intelligence and numerical abilities. Test I has a mean of 136 with a σ of 15 and an r of .219. Although D has a relatively high mean (126) and a significant correlation (.208) it was not selected as it was felt that Test I reflected numerical ability to higher degree than D and also measured intelligence. Test J measures both intelligence and verbal abilities and has a mean of 131 with a σ of 15 and an r of .118. Tests H and F measuring intelligence were not selected as it was felt that they were not measuring significant intelligence factors to high enough degree.

The norms were reconsidered and converted to norms consisting of Aptitudes G, N, and Q with critical scores of 125, 120, and 105 respectively.

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Table V shows the relationship between test norms consisting of Aptitudes G, N, and Q with critical scores of 125, 120, and 105, respectively and the criterion for Underwriter 1-57.30. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE V

Relationship Between Test Norms Consisting of Aptitudes G, N, and Q with Critical Scores of 125, 120, and 105, respectively and the Criterion for Underwriter 1-57.30
N = 81

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	10	34	44
Poor Workers	18	19	37
Total	28	53	81

r_{tet} = .43 X^2 = 4.880

$\sigma_{r_{tet}}$ = .18 p/2 $<$ .025

The data in Table V yield a tetrachoric correlation coefficient of .43 with a standard error of .18, and a Chi Square of 4.880 which yields a p/2 value of less than .225, indicating a high degree of relationship between the recommended test norms and the criterion for this sample.

III. Conclusions

On the basis of all the foregoing considerations, Aptitudes G, N, and Q with critical scores of 125, 120, and 105 respectively are recommended as norms for the occupation of Underwriter 1-57.30